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Conference Abstract

eDNAqua-Plan—Standardisation Overview for eDNA Sequencing of Aquatic Organisms and the Downstream Data Ecosystem

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Abstract

The eDNAqua-Plan project stands as a beacon of innovation in the biomonitoring of marine and freshwater ecosystems, propelled by the urgent need to integrate DNA-based approaches in aquatic bioassessment and monitoring frameworks. The broad utilisation of cutting-edge environmental DNA (eDNA) and DNA barcoding methodologies is

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dependent on complete, reliable, and accessible reference DNA sequence data (Rimet et al. 2021). Complete and interoperable metadata is crucial to allow a broad reuse of (e)DNA data and analysis outputs, and for a broader uptake of results by end users.

The eDNAqua-Plan project aims to address key limitations to the routine implementation of eDNA-based monitoring methods in Europe by developing plans for federated DNA barcode reference libraries and eDNA data repositories to support DNA-based environmental monitoring. This will ensure a sustainable and reliable infrastructure to underpin its broad use, thereby paving the way for more effective conservation and management strategies. The project is working towards creating a comprehensive overview of standardisation efforts and data workflows, through collaborations with other projects, initiatives and infrastructures for aquatic monitoring across the European Union (EU) and associated countries. We are analysing existing archives (e.g., International Nucleotide Sequence Database Collaboration (INSDC), Barcode of Life Data System (BOLD), Global Biodiversity Information Facility (GBIF), Ocean Biodiversity Information System (OBIS)), portals, and papers to determine current and best practices through the use of questionnaires, manual evaluation of repositories, and machine learning methods (LLMs). This includes an overview of the usage of existing metadata and data standards (e.g., Minimum Information about any (X) Sequence Specifications from the Genomics Standards Consortium (GSC), Darwin Core standard). The results are being integrated by a team of experts in marine and freshwater biomonitoring.

With a diverse consortium comprising 18 partner institutions from 11 countries and one international institute, eDNAqua-Plan brings together experts in marine and freshwater monitoring, eDNA analysis, and data science. The collective effort by this consortium will lay the groundwork for the creation of a digital ecosystem of eDNA repositories and an integrated reference library of marine and freshwater species, adhering to FAIR (Findable, Accessible, Interoperable, and Reusable) principles.

Keywords

data standards, barcoding, metabarcoding, biomonitoring, marine ecosystems, freshwater ecosystems

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Conflicts of interest

The authors have declared that no competing interests exist.

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